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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/022,317	12/18/2001	William A. Wojtczak	451-Div	3248

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ATMI, INC.  
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DANBURY, CT 06810

EXAMINER

CHEN, KIN CHAN

ART UNIT	PAPER NUMBER
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1765

DATE MAILED: 07/15/2003

3

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/022,317

Applicant(s)

WOJTCZAK ET AL.

Examiner

Kin-Chan Chen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-56 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-56 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2. 6) ☐ Other:

## **DETAILED ACTION**

### ***Claim Objections***

1. Claim 43 is objected to because of the following informalities:

In claim 43, it contains a typographic error, "44" at the end of line. Appropriate correction is required.

### ***Claim Rejections - 35 USC § 112***

1. Claims 1-56 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 1, "high removal rate" or "low removal rate" or "comparable removal rate" is a relative term with no basis for comparison. Thus the metes and bounds of the claim are unclear.

In claims 2, 9, 18, and 19, "greater than about" or "less than about" is indefinite. Because it does not properly define the range. Since "greater (or less) than" and "about" define two different possible ranges, the above phrase renders the scope of the claims unclear.

***Double Patenting***

3. Claims 40-43 are objected to under 37 CFR 1.75 as being a substantial duplicate of claims 34-37. Also, Claims 46-49 are objected to under 37 CFR 1.75 as being a substantial duplicate of claims 50-53. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

4. Claims 1-56 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-15 of U.S. Patent No. 6,527,819 in view of Kaufman et al. (US 6,063,306; hereinafter "Kaufman").

US 6,527,819 teaches a method for chemical mechanical polishing copper, barrier, and dielectric material, two-step polishing may be used. First polishing slurry may be used to polish copper. A second chemical mechanical polishing slurry may be provided. The first slurry has a copper removal rate of greater than 5000 Å / min and a barrier material removal rate of less than 500 Å / min. The second slurry has a barrier material removal rate of greater than 1000 Å / min and a copper removal rate of less than 1000 Å / min and dielectric material removal rate of < 500 Å / min. The first slurry contains colloidal silica, potassium iodate, concentrated inorganic acid and iminoacetic acid. The second slurry contains colloidal silica, potassium iodate, concentrated inorganic acid and iminoacetic acid. The instantly claims differ from the claims of US 6,527,819 by teaches some conventional features such as tantalum, tantalum nitride as

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barrier materials. Kaufman teaches these conventional features. Hence, it would have been obvious to one with ordinary skill in the art to incorporate these conventional features in US 6,527,819 in order to provide their art recognized advantages and produce an expected result.

***Claim Rejections - 35 USC § 103***

5. Claims 1-8, 10-17, 20-56 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mravic et al. (US 6,083,840; hereinafter "Mravic") in view of Kaufman et al. (US 6,063,306; hereinafter "Kaufman").

In a method for chemical mechanical polishing copper, barrier, and dielectric material, Mravic teaches that two-step polishing may be used. First polishing slurry may be used to polish copper. Mravic does not disclose the removal rate of barrier material. However, the first slurry has a copper removal rate similar to the claims. It is expected to have the so-called low removal rate on the barrier in the absence of any evidence showing the contrary. The wafer surface may be chemical mechanical polished with the first slurry. A second chemical mechanical polishing slurry may be provided. Mravic teaches slurry comprises a fumed silica or colloidal, carboxylic acid (or dicarboxylic acid), an oxidizer, and other optional components. The first slurry has a pH within the claimed range and may be modified with ammonium hydroxide (col. 1, lines 19-23, col. 3 line 20 through col. 6, line 55, example 1, and claims 20-28).

Unlike the claimed invention, Mravic does not teach that the second slurry may has a high removal rate on the barrier material and comparable removal rate on copper (e.g., lower removal rate than barrier). In a method for chemical mechanical polishing copper and barrier material, Kaufman teaches that two-step polishing may be used. First polishing slurry may be used to polish copper. The second slurry is able to selectively polishing the barrier with high removal rate on barrier and comparable removal rate on copper (e.g., lower removal rate than barrier), see col. Col. 3, lines 27-31, and examples and Tables). Hence, it would have been obvious to one with ordinary skilled in the art to use composition and method of Kaufman in Mravic because both are used for the same purpose (polishing copper and barrier). The combined prior art is silent in the polishing rate of dielectric layer. However, it is expected to have "low removal rate" in the absence of any evidence showing the contrary. The combined prior art also teaches particles size, fumed silica and colloidal silica, using barrier material such as tantalum, tantalum nitride in the instant dependent claims.

"It is prima facie obvious to combine two compositions each of which is taught by the prior art to be useful for the same purpose, in order to form a third composition which is to be used for the very same purpose."

*In re Kerkhoven* 205 USPQ 1069 (CCPA 1980). Cites *In re Susi* 169 USPQ 423, 426 (CCPA 1971); *In re Crockett* 126 USPQ 186, 188 (CCPA 1960). See also *Ex parte Quadranti* 25 USPQ 2d 1071 (BPAI 1992).

6. Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kaufman et al. (US 6,063,306; hereinafter "Kaufman") alone, or alternatively in view of Farkas et al. (US 6,001,730; hereinafter "Farkas").

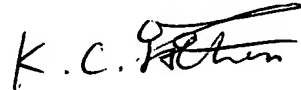
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In a method for chemical mechanical polishing copper and barrier material, Kaufman teaches that two-step polishing may be used. First polishing slurry may be used to polish copper. The second slurry is able to selectively polishing the barrier with high removal rate on barrier and comparable removal rate on copper (e.g., lower removal rate than barrier), see col. Col. 3, lines 27-31, and examples and Tables. Kaufman makes no mention of the polishing rate of barrier material in the first CMP slurry. However, it is expected to have "low removal rate" in the absence of any evidence showing the contrary. Although Kaufman is silent about the polishing rate of the second slurry for the dielectric layer, it is expected to have "low removal rate" in the absence of any evidence showing the contrary since there is no any numerical value for the removal rates ("low" or "high") is defined. In alternative, Farkas teaches two-step CMP polishing for copper and barrier material. The first slurry is used to polish copper, the second slurry is used to polish the barrier faster than the dielectric or the copper (abstract). Farkas teaches numerical values for the removal rates, which are consistent with the criteria of each slurry according to Kaufman. Hence, it would have been obvious to one with ordinary skilled in the art to incorporate Farkas in to the process of Kaufman because both are used for the same purpose (two step copper /barrier CMP).

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kin-Chan Chen whose telephone number is (703) 305-0222. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Benjamin Utech can be reached on (703) 308-3836. The fax phone

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numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-2934.

A handwritten signature in black ink, appearing to read "K.C. Chen", with a stylized flourish at the end.

Kin-Chan Chen  
Primary Examiner  
Art Unit 1765

K-C C  
June 27, 2003